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(12) UK Patent Application (19) GB (11) 2 207 079 (13) A

(43) Application published 25 Jan 1989

(21) Application No 8811766

(22) Date of filing 18 May 1988

(30) Priority data

(31) 62/106986

(32) 14 Jul 1987

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B29C 67/18 // B29K 105:22 B29L 31:36

(52) Domestic classification (Edition J):

B5A 1R214A 1R214H 1R422 1R439J B1

U1S 2067 B5A

(56) Documents cited

GB A 2019769

GB 1431324

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(58) Field of search

B5A

Selected US specifications from IPC sub-classes

B29C B29D

(54) Insert molded body

(57) An insert-molded body comprises a metallic portion; a resin material integrally formed with the metallic portion therearound; and a seal material for providing a reliable seal between the metallic portion and the resin material. The seal material is permeable and elastic and has affinity. The seal material may be coated on a surface of a terminal constituting the metallic portion in advance. The seal material covers any slight irregularities of the surface of the terminal. The coated seal material shrinks with the shrinkage of the resin material during insert-molding along a contact surface between the terminal and a terminal frame. The seal material may be constituted by a rubber liquid gasket of a semi-dry viscoelastic type mainly composed of a special synthetic rubber. The metallic portion may be insert-molded into a synthetic resin. A particular example relates to a terminal support part in a fuel level detector of a vehicle fuel tank.

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FIG. 1
PRIOR ART

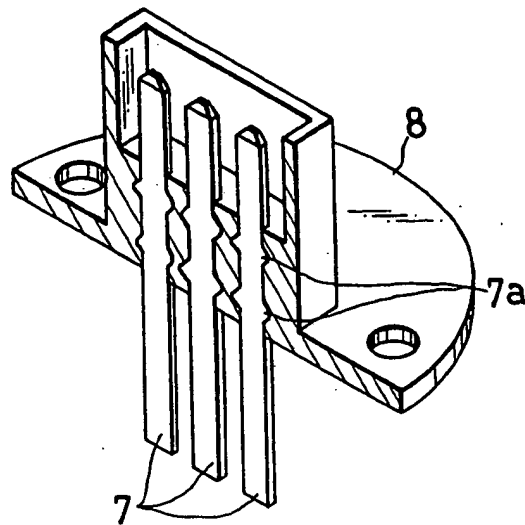


FIG. 2
PRIOR ART

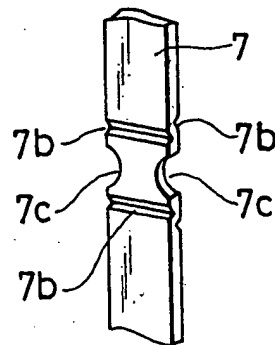


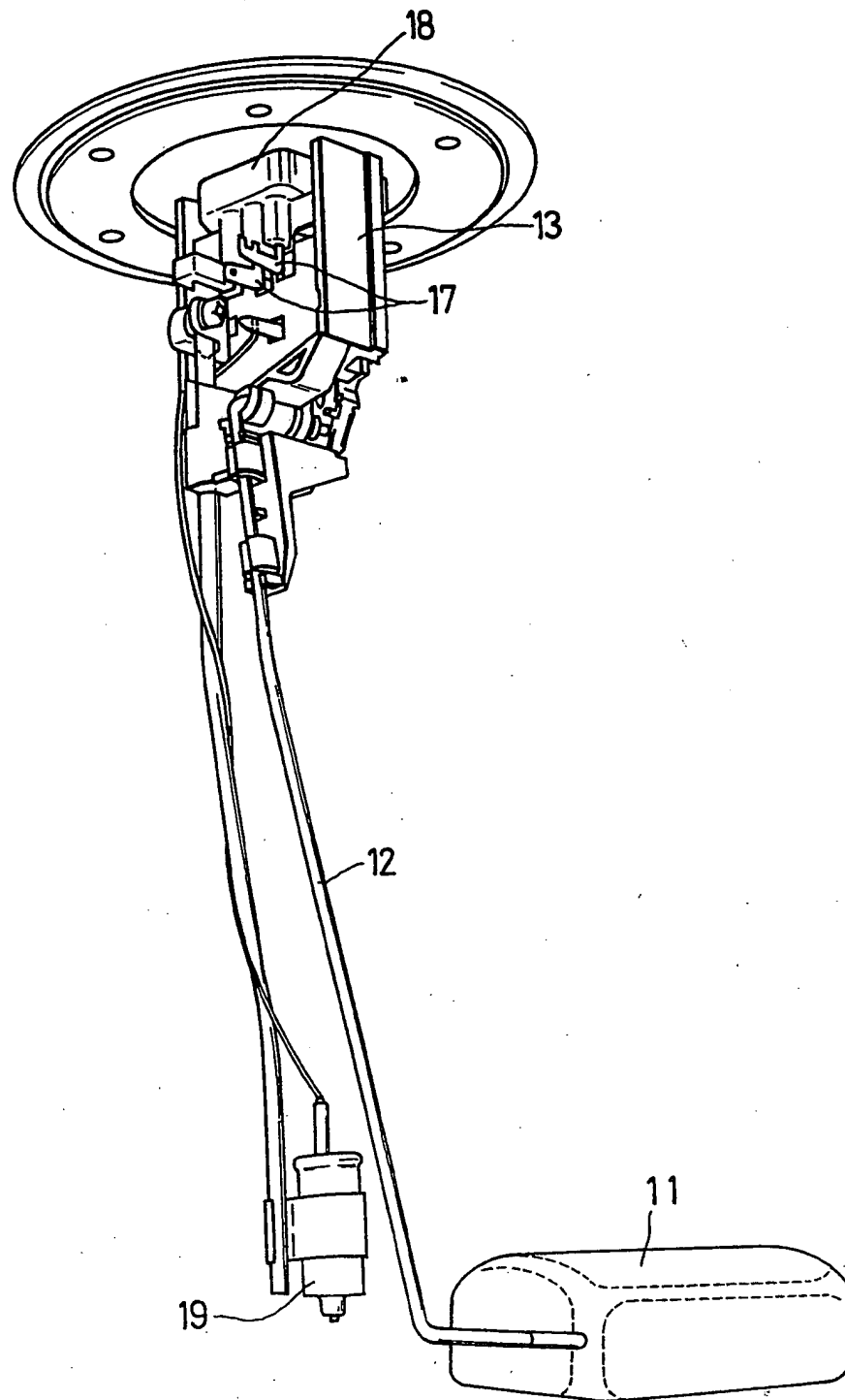
FIG. 3

FIG. 4

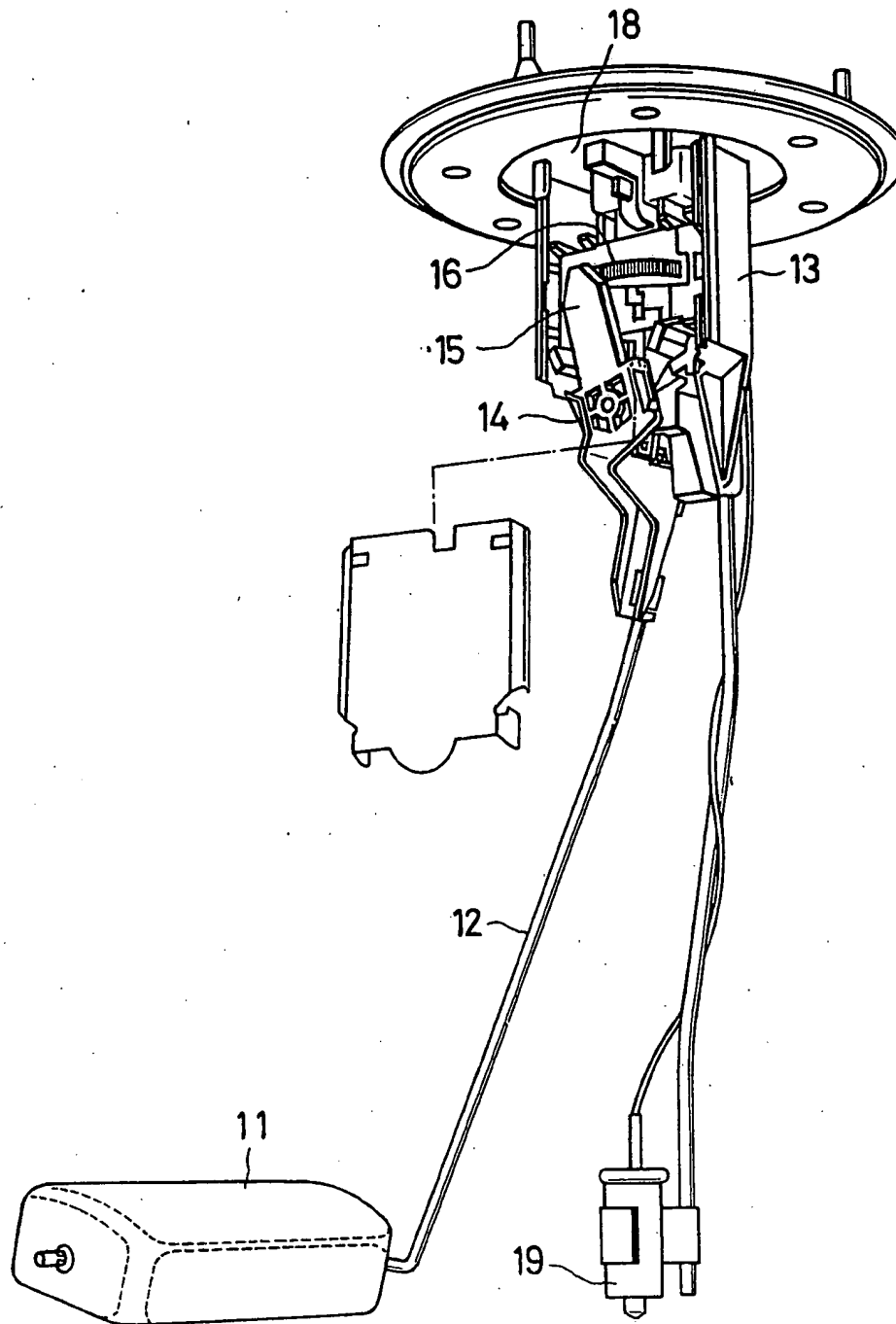


FIG. 5

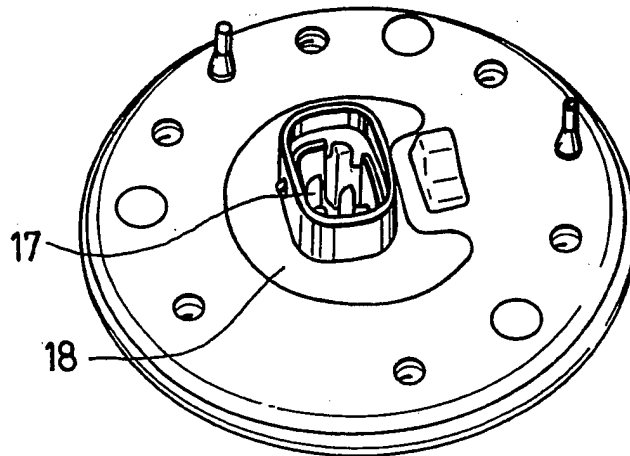
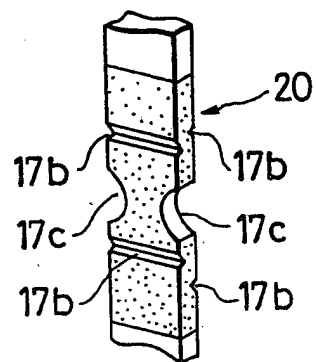


FIG. 6



INSERT-MOLDED BODY

The present invention relates to an insert-molded body
5 or part for improving the seal between an inserted metallic
portion and a synthetic resin formed therearound.

BACKGROUND OF THE INVENTION

An insert-molded body of this kind is used for various
10 kinds of machines and devices. A terminal support part in
a detector for detecting the liquid level of a fuel tank of
a vehicle is described next as an example of a conventional
insert-molded body.

In such a conventional insert-molded body, as shown in
15 Fig. 1, a terminal 7 is integrally fixed by an
insert-molding method to a terminal frame 8 generally made
of synthetic resin. A contact portion of the terminal 7
with the terminal frame 8 is formed with a V-shaped or
R-shaped cut, or the like, so as to provide a secure seal
20 between the terminal 7 and the terminal frame 8.

Fig. 1 shows a cross-sectional view of the contact
portion of the terminal 7 and the terminal frame 8 in a
conventional insert-molded body. Projecting V-shaped
portions 7a are disposed on both sides of the terminal 7.
25 The shape of the terminal 7 may be changed in various
modifications. For example, as shown in Fig. 2, the
terminal 7 may have V-cut portions 7b on the front and rear
faces thereof, and R-cut portions 7c on both sides thereof.

As mentioned above, the attaching portion of the
30 terminal should be formed so as to secure a proper seal of
the fuel tank, but a sufficient seal cannot be obtained by
a slight irregularity on a surface of the terminal 7, a
slight clearance at a corner thereof, and a clearance
caused by shrinkage of the resin when the terminal frame 8
35 is formed.

SUMMARY OF THE INVENTION

To overcome the problems mentioned above, an object of the present invention is to provide an insert-molded body for obtaining a sufficient seal, in which the insert-molded
5 body may be formed by insert-molding a metallic portion into a synthetic resin.

With the above object in view, the present invention resides in an insert-molded body comprising a metallic portion; a resin material integrally formed with the
10 metallic portion therearound; and a seal material for providing a reliable seal between the metallic portion and the resin material. The seal material is permeable, elastic and has affinity. The seal material may be coated on a contact surface of a terminal constituting the
15 metallic portion in advance. The seal material covers any slight irregularities of the surface of the terminal. The coated seal material shrinks with the shrinkage of the resin material during insert-molding, along the contact surface between the terminal and a terminal frame. The
20 seal material may be constituted by a rubber liquid gasket of a semi-dry viscoelastic type mainly composed of a special synthetic rubber. The metallic portion may be insert-molded into a synthetic resin.

25 BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be more apparent from the following description of the preferred embodiments thereof in conjunction with the accompanying drawings in which:

Fig. 1 is a perspective cross-sectional view of an
30 attaching portion of a terminal in a conventional insert-molded body;

Fig. 2 is a perspective view showing an example of the shape of a conventional terminal;

Fig. 3 is a perspective view of a liquid level
35 detector from the front side thereof to which the present invention is applied;

Fig. 4 is a perspective view of the liquid level detector as seen from the rear side thereof;

Fig. 5 is a perspective view of the liquid level detector as seen from the upper side thereof; and

5 Fig. 6 is a perspective view showing a main portion of an insert-molded body in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

10 The preferred embodiments of the present invention will now be described with reference to the accompanying drawings.

In Figs. 3 to 5, a liquid level detector to which the present invention is applied comprises a float 11 for
15 floating on a liquid surface within a fuel tank for a vehicle, for example, a float arm 12 for holding the float 11 at one end thereof, a frame 13 fixed to the fuel tank and rotatably supporting the float arm 12, a contact
portion 15 attached to the other end of the float arm 12
20 through a holder 14, and a resistor 16 opposite the contact portion 15 within the frame 13 and fixed into the frame 13 such that the contact portion 15 is slid along the resistor 16.

When the float 11 is moved upwards or downwards by a
25 change in height of the liquid level within the tank, the float arm 12 is rotated around the frame 13 so that the contact portion 15 is slid along the resistor 16, thereby changing the contact position thereof. Accordingly, the change in resistance of the resistor in a detecting circuit
30 for detecting the liquid level can be converted into an electric signal to display this change with an instrument. A terminal 17 is disposed to transmit this detecting electric signal to the instrument, and is formed by a
metallic piece which is electrically conductive. The
35 terminal 17 is integrally held by a terminal frame 18 made

of synthetic resin, and both ends of the terminal 17 project on the inner and outer sides of the fuel tank. The end of the terminal 17 within the fuel tank is electrically connected to the detecting circuit including the resistor 16, and the end of the terminal 17 outside the fuel tank is electrically connected to a connecting cable leading to a meter. When the liquid level within the fuel tank falls to a predetermined level, a thermistor 19 detects this state and sends an alarm to a driver.

As shown in Fig. 6, the terminal 17 of the liquid level detector constitutes a metallic portion to be inserted, and the terminal frame 18 made of synthetic resin is integrally disposed with the terminal 17 therearound.

V-cut portions 17b are disposed on the front and rear faces of the terminal 17, and R-cut portions 17c are disposed on the sides of the terminal 17. A contact portion including these cut portions and contacting the synthetic resin is coated with a seal material 20, forming a seal layer.

The seal material 20 may be constituted by a material which is permeable and elastic and has affinity, such as a rubber liquid gasket of a semi-dry viscoelastic type mainly composed of a special synthetic rubber. The contact surface of terminal 17 is coated in advance with the seal material 20, and then the terminal frame 18 made of synthetic resin is fixed by an insert-molding method around the perimeter of the terminal 17. Thus, the seal material 20 covers or fills in any slight irregularities of the surface of the terminal, and the coated seal layer is able to shrink with the shrinkage of the resin during insert-molding time along the contact surface between the terminal 17 and the terminal frame 18, thereby preventing any minute clearances from being formed therebetween.

As mentioned above, an insert-molded body in accordance with the present invention can improve the seal

thereof by a seal layer disposed between a metallic portion and a material made of synthetic resin, and therefore the insert-molded body is suitable for many applications, such as, for example, a support portion of a terminal in a
5 liquid level detector attached to a fuel tank of a vehicle, etc.

WHAT IS CLAIMED IS:

1. An insert-molded body comprising:
a metallic portion;
5 a resin material integrally formed with the metallic portion therearound; and
a seal material for providing a reliable seal between the metallic portion and the resin material, said seal material being permeable and elastic and having affinity.
- 10 2. An insert-molded body as claimed in claim 1, wherein the seal material is coated on a surface of a terminal constituting the metallic portion in advance.
- 15 3. An insert-molded body as claimed in claim 2, wherein the seal material covers any slight irregularities of the surface of the terminal.
- 20 4. An insert-molded body as claimed in claim 2, wherein the coated seal material shrinks with the shrinkage of the resin material during insert-molding along a contact surface between the terminal and a terminal frame.
- 25 5. An insert-molded body as claimed in claim 1, wherein the seal material is constituted by a rubber liquid gasket of a semi-dry viscoelastic type mainly composed of a special synthetic rubber.
- 30 6. An insert-molded body as claimed in claim 1, wherein the metallic portion is insert-molded into a synthetic resin.

7. An insert-moulded body substantially as hereinbefore described with reference to, and as shown in, Figures 3, 4, 5 and 6 of the accompanying drawings.

5 8. Any novel feature or combination of features disclosed herein.

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